

1. Feasibility study and design for Landform Modification Project # 4 & 5

What: The purpose of this project is to complete a feasibility study, conceptual design, and permitting for the Landform Modification Project # 4, Middle Rincon Bayou Diversion to South Lake Area and # 5, North Lake Diversion to South Lake System. Additionally, the feasibility of pumping river water to South Lake should be examined.

Why: The Nueces BBASC identified that one of the strategy options for achieving the environmental flow standards within the Nueces Estuary is to “*Explore Landform Modifications to Nueces Bay and Nueces Delta*”, and was completed in the 2015 project. When researchers modeled pumping with the addition of the diversions presented in project 4 & 5, there was more acreage inundated to South Lake, an area of concern that previously received little freshwater from pumping events. The landform modifications should be further investigated in order to maximize the current usage of pumping freshwater to the Rincon Bayou.

How: Perform a feasibility study and create a conceptual design for the landform modifications.

Where: In the Nueces Delta, off of the Rincon Bayou to South Lake.

When: 1 year

Who: Qualified contractor and registered engineer

Cost: TBD

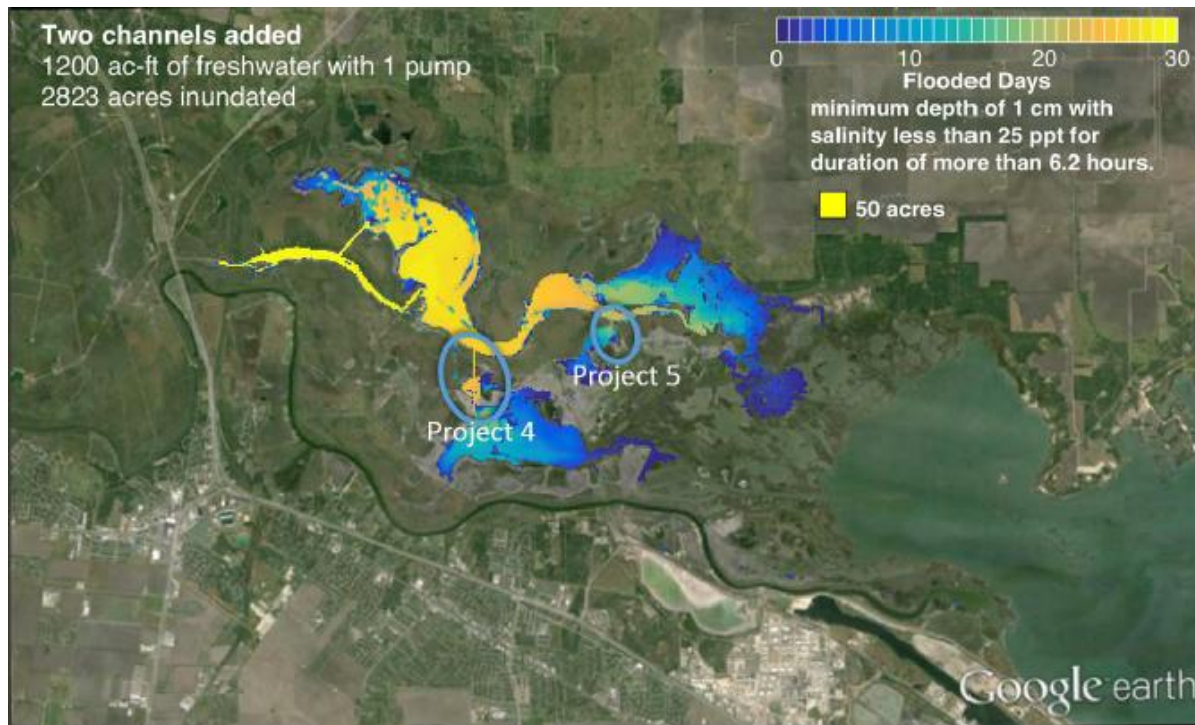


Figure from the 2015 Landform Modification project. Image shows the locations of project 4 & 5 and hydrodynamic model results after adding the diversions.

2. Identify vegetation/marsh changes occurring in the Rincon Bayou Delta and relationship of those changes to freshwater inflow

What: The purpose of this project is to identify changes in the areal extent of the Nueces Delta marsh as they relate to changes in sediment loading, freshwater inflows, subsidence, sea level, rise and other factors.

Why: Recommended by the BBASC in the Nueces BBASC Tier 2b Bays Work Plan, *Identify vegetation/marsh changes occurring in the Rincon Bayou Delta and relationship of those changes to freshwater inflow (and other impacts): Health of the marsh plant community in the Rincon Bayou delta has been used to demonstrate effects of changes in freshwater inflow. Continue field studies in the Rincon Bayou delta to track changes in vegetation and marsh condition and relate those changes to freshwater inflow patterns.*

This project would quantify the loss of internal deltaic marsh over time. It has been well documented that the outer marsh edges of the Nueces Delta are eroding rapidly, however there has been no research to quantify the changes in the internal marsh complexes. This is important because it appears that the open water areas of the Nueces Delta are expanding. This could be due to decreased freshwater inflows, sediment loading or other factors such as subsidence, sea level rise, and erosion.

How: Couple mapping, analysis of historical aerial imagery, and field surveys, if needed, to map and compare wetland changes.

Where: In the Nueces Delta

When: 1 year

Who: Qualified contractor

Cost: TBD



3. Nueces Bay Circulation Assessment Project

What: The purpose of this project is to collect water circulation data in Nueces Bay in order to assess circulation patterns in the area and provide the baseline data needed to determine how freshwater inflows are moving within the bay.

Why: There is great interest in how freshwater input patterns affect the Nueces Estuary. When combined with water quality and biological monitoring data, circulation data may provide important additional insights into how freshwater inflows influence the ecology in different areas of the system. The current data gathered in Nueces Bay will also be valuable for the future development and validation of a circulation model for the bay.

How: An array of tilt meters deployed over the back end of Nueces Bay (from Salt01 west to the Nueces Delta) would collect approximately 1 year of continuous circulation monitoring data that would improve our understanding of the movement of freshwater inputs within the system. Tilt meters could also be placed at the Nueces River mouth and the entrance to Rincon Bayou from Nueces Bay to assess water exchange between the main inflow connections and the bay. Tilt meters require maintenance every two weeks to remove fouling and offload data. Raw data from the meters can be manually processed and subjected to quality control procedures. The final outcome would be baseline data of water circulation patterns from Salt01 west to the Nueces Delta and a visual representation of current movements in Nueces Bay under various conditions (wind, tide, freshwater inflow events) seen during the project period.

Where: In Nueces Bay from Salt01 west to the Nueces Delta and including the lower portion of the Nueces River and the mouth of Rincon Bayou.

When: A years' worth of monitoring would allow for data to be collected during all seasons of the year. Another 3 months' time would be needed to write up a final report and develop the visualization tools of currents in Nueces Bay.

Who: Contractor familiar with utilizing tilt meters and analyzing circulation data.

Cost: \$60,000 to deploy tilt meters for a year, with data retrieval every other week, data analysis, final report writing, and visualization tools.



Each tilt meter looks like a two foot pipe with a tether on one end and a cap on the other. The tether attaches the meter to a stake anchored in the sediment, allowing the meter to float freely in the water above. A data logger under the cap records how far and in what direction the meter leans in a current. The angle and direction of the tilt can then be converted to current speed and direction.



4. Re-examination of the 2001 Agreed Order monthly targets: Phase II

What: The purpose of this project is to follow up on the 2015 project, “Re-examination of the 2001 Agreed Order monthly targets”, and examine impacts of adjusting monthly target pass through requirements.

Why: As described in Section 4.1 of the Nueces BBEST Environmental Flows Recommendations Report, there has been a shift in monthly freshwater inflow patterns to the Nueces Bay, and based on this analysis there is a similar pattern of inflow into the reservoirs. Section 2.3 of the Nueces BBASC Environmental Flows Recommendations Report describes reservoir operations and the Agreed Order, pointing out that there might be an opportunity to better manage the limited freshwater resource by reviewing new data that was not available during the creation of the 1995 Agreed Order, which is the basis for the current pass through operation of the reservoir system.

During low pass- through months, such as January and February (2500 acre feet) and March and April (3500 acre feet), after calculating the pass through requirements they are often very small. These amounts are so small that the committee feels it is not an efficient use of the pumped freshwater. Therefore, a re-examination of the specific monthly targets should be performed.

How: A small project should re-evaluate the monthly targets by moving some water from the highest acre-feet months (i.e. May, June, September) to the ones with lower acre-feet (i.e. January, February) and then evaluating safe yield. The annual target amount will not change. End product would be recommendation for 10 year pilot project with new monthly inflow targets.

Table shows the current monthly pass through targets when the reservoir system is greater than or equal to 70% of storage capacity, as written in the 2001 Agreed Order. Total annual target amount is 138,000 acre-feet.

January	2,500	July	6,500
February	2,500	August	6,500
March	3,500	September	28,500
April	3,500	October	20,000
May	25,500	November	9,000
June	25,500	December	4,500

Where: Nueces River Basin.

When: 1 years

Who: Qualified contractor

Cost: TBD

5. Nutrient budget for Nueces Bay

What: The purpose of this project is to identify all nutrient sources and sinks to the tidal segment of the Nueces River and Nueces Bay, develop a nutrient budget, and quantify loading to the tidal segment of the river and the bay.

Why: Nutrient inputs to coastal waters are an important element in the ecology and health of estuarine ecosystems. The Environmental Protection Agency has been encouraging states to address nutrients in a quantitative manner and particularly favors establishment of numerical criteria for nutrients. The Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholder Committee agrees that there is a potential for nutrient levels to affect aquatic plants and other biological resources and believes there is a need for a watershed approach to allow for effective management the estuary. A fundamental aspect of this approach is recognition that nutrient loading can be too high, thus degrading water quality, or too low (artificially reduced) therefore adversely affecting ecological productivity. Proper management first requires identifying whether nutrient loading is too high or too low. This project is following up on the “Nueces watershed pre- and post- development nutrient budgets”.

How: The previous study focused on the entire Nueces Watershed and the changes before and after building Choke Canyon. This study will focus on nutrient inputs to the Lower Nueces Bay Watershed, including the tidal segment of the Nueces River, sub-watersheds surrounding Nueces Bay, and point sources such as treated wastewater effluents. This project will develop nutrient budgets based on a quantitative understanding of the natural supply of all nutrient forms and the anthropogenic changes in these supplies over time for the Lower Nueces Bay watershed. Nutrient budgets for both the present and pre-development condition (before and after Choke Canyon) will be developed using data from an extensive network of stream gauges plus existing monitoring data contained within macro-detritus collected from the lower Nueces River, Nueces Bay and delta. Ascertaining annual loads for both the pre-development and present condition will provide a strong indication of trends and potential problems and will facilitate building consensus on a desired future condition for estuarine productivity, where chlorophyll *a* and other measures are the basis for determining desired conditions. Methods could include an extensive literature search, analysis of TCEQ data, land use/land cover analysis, and changes in point sources.

Where: In the Nueces Bay and the surrounding watersheds.

When: 1 year

Who: Qualified contractor

Cost: TBD